Remarks

Assignee appreciates the Examiner's indication of allowability of claims 4-7 and 9.

Claims 1-3 and 8 stand rejected under 35 USC §103(a) as obvious over Wilshaw, U.S. Patent 6,030,704, in view of Dyer, U.S. Publication 2002/0132106, with Tomioka, U.S. Patent 5,651,978 cited as a supporting reference to show that a wide variety of silver salt solutions are recognized to have antimicrobial properties.

Assignee respectfully requests reconsideration, because assignee believes that the Office Action misinterprets the disclosures of Wilshaw and Dyer and that the combined references in any event fail to meet the limitations of the claimed invention.

Discussion of Wilshaw

Wilshaw teaches essentially a silicate (e.g., clay) particle coated with a film of polymer material. To form the particles that will serve as the cores, Wilshaw teaches the possibility of forming a foamed ceramic made from a slurry of the silicate material selected and a gas (e.g., air), drying the foam, and crushing the foam to create the particles needed. See Wilshaw, col. 1, line 62 to col. 2, line 3; col. 2, lines 21-27; col. 3, lines 55-67; col. 4, lines 4-27, 42-54. Wilshaw teaches, as pointed out in the Office Action, that a biocide can be added to the foamed ceramic during or after its manufacture. Col. 4, lines 28-31, 38. Next, the cores thus created are coated, around the entire surface, with the polymer material. E.g., Wilshaw, col. 5, lines 50-60; col. 6, lines 41-48. Wilshaw makes a big deal about his coating covering pores and cavities in the surface, teaching that this causes an increase in the surface area of the polymer. Wilshaw, col. 5, lines 50-51; col. 6, lines 53-57; col. 6, line 65 to col. 7, line 19; col. 7, lines 23-28.

Wilshaw teaches that the polymer material in question may have a polar part and a non-polar part. The clay part serves to bind the polar part, so that the polymer coating attaches firmly to the substrate, while the non-polar (positive) part is available to bind contaminants. See Wilshaw, col. 6, lines 59-64; col. 7, lines 19-29.

Apparently, the biocide's purpose is to kill organic material in the core material, before it is coated with polymer (perhaps because the organic material might cause detachment of the coating).

Whatever the purpose, however, it seems quite apparent that the polymer coating would over-coats the biocide material, preventing the biocide from being on the outside

PAGE 6/10 * RCVD AT 11/22/2005 7:39:29 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/27 * DNIS:2738300 * CSID:480 948 3387 * DURATION (mm-ss):03-26

of the polymer. The ordinary observer would understand Wilshaw's teaching in that way from the parts of the reference cited above. At no point does Wilshaw teach or suggest using biocide to assist in screening organic matter from the oily water being filtered.

As the Office Action recognizes, "Wilshaw does not teach irrigating a multitude of contaminant-sorbent polymer particles with a solution containing an antimicrobial compound."

Discussion of Dyer

Dyer, the secondary reference, discloses a fiber-foam composite that apparently is oil-sorbent. Dyer states, as cited by the Office Action, that the composite material can have various surface treatments, such as a biocide. However, Dyer's discussion of biocide surface treatments, at paragraphs [0141]-[0143], makes clear that the surface treatment involves chelation or various alternatives, all of which hold the metal (silver) biocide molecules to the fiber-foam composite. Accordingly, the antimicrobial material is not part of, *i.e.*, "grafted to," or "reactive with," the polymer. Instead, Dyer discloses various techniques of temporarily attaching biocidal agents as surface treatments.

As the Office Action also recognizes, "The specific nature of the 'post-treatment with silver iodide' is not clear." Accordingly, Dyer also fails to disclose irrigating polymer particles with antimicrobial compound in solution.

Discussion of Claim 1

Turning to claim 1, as originally presented and rejected, the claim specified the step of "irrigating a multitude of contaminant-sorbent polymer particles with a solution containing an antimicrobial compound; wherein the antimicrobial compound and the polymer of the particles are reactive together; ... whereby the antimicrobial compound grafts onto the polymer particles ...." Assignee has amended claim 1 to clarify that the fact that the biocide and the polymer are reactive together means that the biocide grafts to the polymer as a result of the irrigating step. While the wording of claim 1 is changed slightly, the scope of claim 1 is completely unchanged, in assignee's view. Assignee respectfully requests the Examiner to confirm that he has rewritten the claim without altering its scope substantively and indicate that it is allowed as rewritten.

PAGE 7/10 * RCVD AT 11/22/2005 7:39:29 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/27 * DNIS:2738300 * CSID:480 948 3387 * DURATION (mm-ss):03-26

As clarified, assignee respectfully submits that all claims stand in condition for allowance, for several reasons:

First, neither Wilshaw nor Dyer (nor Tomioka) disclose irrigating polymer particles in a solution containing an antimicrobial compound. The Office Action seems to concede as much, and absent this element (which is explicitly in the claim, part (a)) being found in the prior art, the obviousness combination proposed cannot remain standing.

Second, the Office Action's reasoning (on page 3) for holding that the admittedly omitted element "would have been obvious" mischaracterizes the combined references.

(a) The paragraph begins by recognizing "the presence of both hydrophobic moieties and hydrophilic moieties on the surface of Wilshaw's polymer-coated foamed ceramic particles ...." Respectfully, that premise is faulty – Wilshaw makes clear that the hydrophilic moiety (the polar part) is bound to the clay substrate (see Wilshaw 6/60-61) and not "on the surface" of the polymer coating. At best, the antimicrobial compounds, in Wilshaw, are not on the surface of the coated polymer fragments, instead they are buried between the core and the polymer overcoat. Indeed, Wilshaw even fails to specify that the antimicrobial compound remains present after the coating process, and it is not at all clear that it does.

(b) It is not clear that a polymer coating could ever have both hydrophilic and hydrophobic moieties on an outside surface. Even if possible, claim 1 specifies that "the polymer is substantially phobic to water ...." If the Office Action had correctly interpreted Wilshaw to have significant hydrophilic moiety on the polymer surface, then it is not clear whether Wilshaw would meet the claim limitation of being "substantially phobic," and the Office would have a difficult time demonstrating that Wilshaw contained that teaching.

(c) After stating the defective premise that Wilshaw discloses "both hydrophobic moieties and hydrophilic moieties on the surface," the Office Action proceeds to state that Dyer would have motivated the ordinarily skilled artisan to irrigate Wilshaw's clay-core polymer-coated particles "in a solution of an antimicrobial compound, such as silver iodide or other silver salt, in view of the recognition that silver ions from said solution upon contact with a hydrophilic moiety would be expected to impart antimicrobial properties on the particle." Respectfully, assignee does not understand this assertion: If the polymer had hydrophilic binding sites on its outside,

PAGE 8/10 * RCVD AT 11/22/2005 7:39:29 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/27 * DNIS:2738300 * CSID:480 948 3387 * DURATION (mm-ss):03-26

then such sites would seem to quickly bind the liquid base of such a hypothesized solution (that is, water), and it is not clear at all that any appreciable quantity of silver iodide or other silver salt would bind to the polymer coating. The Office Action discloses no reference, properly combined with the base references, that describes selecting a solution other than water, nor any polymer-solution pair non-reactive together, such that the selected solution containing the hypothesized silver salt does not bind to the polymer but the silver salt (biocide) does.

Despite the clear distinction over the combination of Wilshaw and Dyer arising from the irrigation step (part (a) of claim 1, supplemented by part (c)), assignee has voluntarily amended claim 1 to move to a more prominent place the language specifying that the reaction between the polymer and the antimicrobial compound causes the latter to be "grafted to" the polymer surface. The claim language (both before and after the amendment) clarifies that the irrigation step causes the antimicrobial compound to be bonded to the contaminant-sorbing fragments permanently, with covalent bonds. This provides a further distinction over the proposed combination, because Dyer discloses his silver salts being attached by chelation to the polymer and does not motivate the ordinarily skilled artisan to have made the antimicrobial compound and the polymer of the particles reactive together so as to cause the antimicrobial compound to graft onto the polymer particles. Assignee encloses a page from Hawley's Condensed Chemical Dictionary explaining the process of grafting and graft-polymers. Significantly, grafting involves the creation of chemical covalent bonds linking the antimicrobial material with both the copolymer and the polymer of the particles.

For all of those reasons, assignee submits that claims 1-9 are allowable.

Claims 21-31

Assignee adds claims 21-31. Assignee respectfully submits that those claims are consonant with this divisional application.

Claims 21-29 repeat claims 1-9 as amended in the recently filed Reply to Written Opinion in related PCT application Serial No. PCT/US02/29061. Those claims add the limitation of a dual-component polymer and are believed allowable for the same reasons discussed above as well as because the prior art is not believed to contain any disclosure

PAGE 9/10 * RCVD AT 11/22/2005 7:39:29 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/27 * DNIS:2738300 * CSID:480 948 3387 * DURATION (mm-ss):03-26

or suggestion of grafting or reacting antimicrobial material to a combination material formed of one copolymer embedded in a second polymer.

Claim 30 contains a different combination of the elements stated in claims 1 and 5, without the elements of claim 4, on which claim 5 depends. Claim 31 depends on claim 30 and contains the added limitation of claim 21 discussed above.

Assignee respectfully requests allowance of those claims as well.

Procedural Matters

The Office Action was mailed on the same date as assignee's submission by facsimile of a supplemental Information Disclosure Statement, citing the Insley patent, which was identified in a related PCT application. Assignee understands that the same Examiner assigned to this case is handling the PCT matter, but nevertheless respectfully requests that the Examiner initial and return form PTO-1449 filed August 23, 2005, so that Insley is cited on the face of the patent issuing from this application.

Assignee also advises the Examiner of the other copending application, Serial No. 10/788,772, also being examined by the same Examiner. Certain references identified in that application have not been cited here, and assignee assumes that the subject matter of those references relates to structural issues not considered relevant to this application.

Assignee respectfully requests that the Examiner pass this application to allowance at the earliest possible moment.

Respectfully submitted,

ABTECH INDUSTRIES, INC.
by its attorney

Dated: November 22, 2005

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PAGE 10/10 * RCVD AT 11/22/2005 7:39:29 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/27 * DNIS:2738300 * CSID:480 948 3387 * DURATION (mm-ss):03-26